Cody Rivera

Curriculum Vitae

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⊕ *github.com/codyjrivera*

Education

2022–present	**Ph.D. in Computer Science**, *University of Illinois Urbana-Champaign*, Urbana, IL Expected Completion Date: May 2027.
2018–2022	**B.S. in Computer Science and Mathematics**, *The University of Alabama*, Tuscaloosa, AL GPA: 4.0/4.0. Minor: Randall Research Scholars Program.

Research Experience

2019–2022	**Undergraduate Research Assistant, High-Performance Computing and Data Analytics Lab**, *The University of Alabama/Washington State University*, Tuscaloosa, AL Research parallel GPU algorithms to process vast amounts of data in machine learning, simulation, and scientific computation workloads more efficiently. Supervised by Dr. Dingwen Tao.
Summer 2021	**Science Undergraduate Laboratory Internship (SULI) Program Intern**, *Argonne National Laboratory*, Virtual Internship Improved the performance of lossy decompression for scientific data, including simulation snapshots and deep neural networks, for faster data processing and analysis on GPUs. Supervised by Dr. Sheng Di.

Publications

Refereed Publications

IPDPS 2022	**C. Rivera**, S. Di, J. Tian, X. Yu, D. Tao, and F. Cappello, "Optimizing Huffman Decoding for Error-Bounded Lossy Compression on GPUs," To appear in *The 36th IEEE International Parallel and Distributed Processing Symposium*, Virtual Event, May 30-June 3, 2022.
Cluster 2021	J. Tian, S. Di, X. Yu, **C. Rivera**, K. Zhao, S. Jin, Y. Feng, X. Liang, D. Tao, and F. Cappello, "Optimizing Error-Bounded Lossy Compression for Scientific Data on GPUs," *2021 IEEE International Conference on Cluster Computing*, Virtual Event, September 7-10, 2021, pp. 283-93.
IPDPS 2021	J. Tian, **C. Rivera**, S. Di, J. Chen, X. Liang, D. Tao, and F. Cappello, "Revisiting Huffman Coding: Toward Extreme Performance on Modern GPU Architectures," *The 35th IEEE International Parallel and Distributed Processing Symposium*, Portland, OR, May 17-21, 2021, pp. 881-91.
JPDC	**C. Rivera**, J. Chen, N. Xiong, S. Song, and D. Tao, "TSM2X: High-Performance Tall-and-Skinny Matrix-Matrix Multiplication on GPUs," *Journal of Parallel and Distributed Computing*, Volume 151, 2021, pp. 70-85.
PACT 2020	J. Tian, S. Di, K. Zhao, **C. Rivera**, M. H. Fulp, R. Underwood, S. Jin, X. Liang, J. Calhoun, D. Tao, and F. Cappello, "cuSZ: An Efficient GPU-Based Error-Bounded Lossy Compression Framework for Scientific Data," *The 29th International Conference on Parallel Architectures and Compilation Techniques*, Atlanta, GA, Oct 3-7, 2020, pp. 3-15.

Software Artifacts

cuSZ: A GPU version of the R&D 100 award-winning SZ, an error-bounded lossy compressor for scientific data. Implemented in CUDA C++ for Nvidia GPUs. Compresses data with compression ratios up to 3.48x higher than other state-of-the-art GPU lossy compressors. URL: `https://szcompressor.org/`

TSM2X: A collection of two GPU algorithms for multiplying irregular-shaped tall-and-skinny matrices: TSM2L and TSM2R. Implemented in CUDA C++ and tuned for Nvidia GPU architectures. Obtains average speedups of up to 1.9x over the vendor-supplied CUBLAS library. URL: `https://github.com/codyjrivera/tsm2x-imp`

Other Experience

2019–2020 **Undergraduate Teaching Assistant**, *The University of Alabama*, Tuscaloosa, AL
Tutored students during lab sessions for introductory computer science courses. Graded student programming projects and proctored exams.

Summer 2020 **Student Training in Engineering Program (STEP) Intern**, *Google*, Virtual Internship
Developed GrowPod, a web app that allows users to join, create, and administer community gardens, using Google Cloud App Engine and Angular. Worked on a team with two other interns and completed the software development lifecycle.

Technical Skills

Programming Languages: C, C++, Python, Java, JavaScript, TypeScript, SQL

Libraries/Frameworks: CUDA, OpenMP, Pandas, App Engine, JUnit, Angular, Material, Bootstrap, Jest

Technologies/Tools: Git, GitHub, Jupyter, Google Cloud, npm, HTML, CSS, LaTeX

Activities and Memberships

Summer 2022	Oregon Programming Languages Summer School
Spring 2021	Randall Research Scholars Program Selection Committee
2020–present	Upsilon Pi Epsilon
2020–present	Pi Mu Epsilon
2018–present	Association for Computing Machinery (ACM)
2018–2022	Randall Research Scholars Program

Awards and Honors

Summer 2022	Oregon Programming Languages Summer School Housing Fellowship
Spring 2022	University of Alabama Department of Computer Science Outstanding Undergraduate Award
Spring 2022	Randall Research Scholars Program H. H. Chapman Outstanding Computer User Award
Fall 2021	R&D 100 Award Winner (as part of "SZ: A Lossy Compression Framework for Scientific Data")
Summer 2020	Randall Research Scholars Program Outstanding Sophomore Award
2018–2022	Randall Research Scholars Program Scholarship
2018–2022	University of Alabama Engineering Leadership Scholarship
2018–2022	University of Alabama Presidential Scholarship